Smith Seckman Reid, Inc.

August 28, 2012

Andrew Jackson State Office Building

Nashville, Tennessee

Fire Alarm System Replacement

Criteria Documents

SSR No. 11420550

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Andrew Jackson State Office Building
Nashville, Tennessee

Narrative Overview

The following report presents a survey of the existing Fire Alarm system located within the Andrew Jackson State Office Building located on the corner of Charlotte Ave. and 5th Ave. North in downtown Nashville, Tennessee. Having been originally constructed in 1967, the facility has undergone several different fire alarm expansions since. This survey will address the current state of the Fire Alarm system and provide descriptions related to its condition and recommendations concerning an anticipated replacement.

The building was built in 1967 as an 18-story high-rise office complex with approximately 411,000 square feet of available space. The basement floor serves as parking, primary electrical entrance and storage. The ground floor serves as visitor's entrance, security, facility support, break area, mechanical and electrical areas. The first floor serves as tenant and employee entrances with limited facility support in the core of the building. Floors 2 through 15 serve as an open office concept with each floor containing some dedicated offices and conference rooms. The 16th floor serves as mechanical equipment floor along with generator and emergency power. The main core of the building houses (2) banks of four elevators around a central lobby. Each side of the elevator banks has a stairwell up through the entire facility to the mechanical floor. The balance of the core area serves as restrooms, limited storage, mechanical, and electrical spaces. The building appeared to be fully-sprinkled.

Fire Alarm Systems

Introduction

The existing fire alarm system is original to the facility with the front-end Notifier Fire Alarm control panel and an existing Edwards distribution system equipment. Some upgrades to the control panel and distribution panels have been done over the years. All existing devices and annunciator appear to be original to the building with only limited devices being added since the facility was constructed. Each floor contains only limited initiating, monitoring, control, and notification devices providing limited coverage of each floor to most areas. These devices are a conventional hardwired system routed to the fire alarm distribution system provided on every third floor, then back to the main control panel on the ground floor in the security office. An annunciator is provided at the security checkpoint on the ground floor. A fire fighter communication system integral to the control panel is in place at each stairwell and elevator lobby. Off-site notification of

an alarm condition is provided to the State of Tennessee Delta room located in the James K. Polk building and only provides an alarm status notification.

In review of some of the areas it appeared that pull stations and speaker/strobes were located at the stairwells of each floor with limited ceiling mounted notification devices located in the open office areas. A few ceiling mounted smoke and heat detectors were located in mechanical, electrical spaces and the elevator lobby area. Some areas had limited or no initiating or notification coverage. Mechanical and electrical spaces were very limited in initiating and notification devices. The fire alarm annunciator at the security checkpoint was not operational during the site visit. The fire alarm system is a conventional hard-wired system approximately 42 years old with some limited upgrades and is need of replacement due to availability of replacement equipment and maintenance and to meet current Life Safety, Fire Alarm codes and ADA requirements. Most of the devices appear to be original to the facility.

Each floor has been modified by various tenants over the years with little or no fire alarm system modifications and therefore has created some areas with little or no coverage as required by Life Safety and Fire Alarm codes. Various Life Safety code violations were apparent during the site visit and included the following:

- Pull station were located at each stairwell serving that floor only. No pull stations were located at the elevators or the main exits from the building on the first floor. NFPA 101 requires pull stations to be located at each exit from the facility and each exit off each floor including elevator lobbies.
- Elevator lobbies had no notification devices as required by NFPA 72 and 101.
- Elevator lobby smoke detectors were located adjacent to the doors leading into the open office area only and none located in front of the elevators as required by NFPA 101. Hold open devices were located at each set of doors leading into the open office area from the elevator lobby to release on alarm to maintain smoke tight area of refuge in the elevator lobby.
- Storage areas appeared to have limited or no smoke detectors installed as required by NFPA 101.
- Stairwells had limited notification device coverage.
- Mechanical spaces including the 16th floor had very limited smoke detection coverage and appeared to be spaced too far apart to provide adequate coverage of the area being served due to ceiling height and configuration.
- Notification devices in the open office areas appeared to be inadequate coverage based on locations and distance from each other, approximately 6 ceiling mounted devices and 2 wall devices per floor.

Recommendations

As previously stated the existing fire alarm system is approximately 42 years old and provides inadequate coverage and notification to meet current codes and ADA requirements. The initiating and notification devices are obsolete and availability of replacement equipment is becoming more difficult. The existing fire alarm system

consist of non-addressable devices which makes trouble-shooting alarms or troubles on the system difficult. There are several life safety issues which should be addressed. It is our opinion that the entire Fire alarm system and Fire Fighters communication system should be replaced with a new integrated Voice/Evac, Fire Fighter Communication, fully-addressable Fire Alarm system. It would be our recommendation to provide the following:

- Complete fire alarm system replacement for the Andrew Jackson State Building to include control panels, pull stations, automatic initialization devices, emergency notification and other related devices. System to be designed to meet current NFPA 72, 101 and IBC applicable fire and building codes for high-rise occupancies.
- The new fire alarm system would be a Voice/Evacuation, fully-addressable fire alarm system with 20% spare capacity to handle future development and changes to the facility.
- Provide additional smoke, heat, automatic initialization devices as required by codes for each area being served.
- Provide fully synchronized visual (strobes) notification devices and audible devices as required to meet applicable codes for the areas being served.
- Provide fully operational fireman's phone system in each area of the facility such as elevator lobbies, entrance to stairwells, Fire Command center, etc as required by applicable codes.
- Provide fire alarm interface with all elevator controls, smoke exhaust systems, HVAC systems, Fire Sprinkler systems as required by applicable codes.
- Removal of the existing fire alarm system and fire fighter communication systems completely.

A more detailed site survey should be under taken to identify floor plan changes, all existing mechanical, electrical, life safety, occupant notification, and fire safety issues related to the respective systems. This survey would identify the issues more clearly to develop a refined design, budget and prioritize the elements of scope that meets the current Building and Life Safety codes.

SECTION 28 05 00

COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Basic materials and methods, along with Division 1, General Provisions that are applicable to Division 28 Sections.

B. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 specification Sections apply to all Division 28 Sections.

1.02 QUALITY ASSURANCE

A. Comply with applicable local, state, and federal codes.

B. Warrant Work against faulty material or Workmanship in accordance with Division 1. If the Project is occupied or the systems placed in operation in several phases at the request of the Owner's Representative, then the warranty of each system or piece of equipment used shall begin on the date each system or piece of equipment was placed in satisfactory operation and accepted as such, in writing, by the Owner's Representative. The use of building equipment for temporary service and testing does not constitute the beginning of the warranty.

C. Equipment and material provided under this Division shall be periodically inspected and serviced by competent technicians. This function becomes the responsibility of the Owner's Representative when the system is accepted by the Owner's Representative. The one year material and Workmanship warranty is not intended to supplant normal inspection or service and shall not be construed to mean the Contractor shall provide free service for normal maintenance items due to normal use, nor to correct without charge, breakage, maladjustment, and other trouble caused by improper maintenance.

D. Upon completion of contract and progressively as work proceeds, clean-up and remove dirt, debris and scrap materials. Maintain premises neat and clean. Protect and preserve access to energized equipment at all times. Clean items with factory finishes. Touch-up minor damage to surfaces; refinish entire piece of equipment when sustained major damage. Use only factory supplied paints of matching color and formula. Schedule an off-hour shutdown of all electrical system equipment during the 2-week period preceding substantial completion.

1.03 REFERENCES

A. Perform Work specified in Division 28 in accordance with standards listed below of the latest applicable edition adopted by the authority having jurisdiction. Where these Specifications are more stringent, they shall take precedence. In case of conflict, obtain a decision from the Designer.
   1. NFPA 20: Standard for Installation of Stationary Pumps for Fire Protection
   2. NFPA 70: National Electrical Code
   3. NFPA 72: National Fire Alarm Code
   4. NFPA 92A: Standard for Smoke Control Systems Utilizing Barriers and Pressure Differences
   5. NFPA 92B: Standard for Smoke Management Systems in Malls, Atria, Large Areas
   6. NFPA 101: Life Safety Code
   7. ANSI-A17.1: Elevators, Dumbwaiters, Escalators and Moving Walks
   8. ANSI Handicapped Code-A117.1
   9. International Building Code
   10. All applicable Occupational Safety and Health Administration (0SHA) Publications, Rules and Regulations
   11. Americans with Disabilities Act (ADA)
   12. ASTM E814-08B: Standard Test Method for Fire Tests of Penetration Firestop Systems.
   13. U.L. Fire Resistance Index

1.04 RELATED WORK SPECIFIED UNDER OTHER DIVISIONS

A. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.

B. Flashing of conduits into roofing and outside walls.

C. Heating, ventilating, and air conditioning equipment.

D. Fireproofing

E. Elevators

F. Automatic Doors

G. Cutting and patching for Work, except for errors and omissions under this Division.

1.05 SUBMITTALS

A. Comply with provisions of Division 01.

B. Submit product data, equipment details, capacities, and shop drawings as specified in sections of this Division.

C. Submit fire alarm point-to-point drawings with product data submission.

1.06 OPERATING AND MAINTENANCE MANUALS

A. Provide manuals in accordance with Division 01.

B. In addition to required submittals, include copies of all test reports required in Part 3, "Execution" of Section 26 05 00.

C. Provide completed warranty certificates for systems and equipment.

D. Provide tabulation of overload heaters, including each motor identified, nameplate data and overload heater part number.

1.07 DELIVERY AND STORAGE

A. Insofar as possible, deliver items in manufacturer's original unopened packaging. Where this is not practical, cover items with protective materials to keep them from being damaged. Use care in loading, transporting, unloading, and storage to keep items from being damaged.

B. Store items in a clean dry place and protect from damage. Evidence of damage from water or other contaminants will be cause for rejection.

1.08 RECORD DRAWINGS

A. Comply with provisions of Division 01.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Equipment and materials furnished shall be listed by UL or other nationally accredited testing laboratory where available. When listing is not available for a piece of equipment, it shall be submitted in accordance with Drawings and Specifications and shall be approved by the authorities having jurisdiction.

B. Specifications and Drawings indicate name, type and/or catalog number of materials and equipment to establish standards of quality. Submittals shall be based on the standards specified. The standards should not be construed as limiting competition.

C. If materials and equipment other than specified herein are intended to be submitted, a letter providing a list of all the suggested alternates by section number, brand and series or model shall be submitted to the prime Designer for review and approval. Submit in accordance with Division 01 or 10 days prior to bids or final pricing are to be submitted. Refer to Instructions to Bidders.

D. Each item of equipment shall be designed and the entire system installed to resist lateral forces using an ICP value of not less than 0.5 and in accordance with the applicable building code.

2.02 WALL AND CEILING ACCESS PANELS

A. Style and type as required for material in which installed.
   1. Size: 16" X 16" minimum, as indicated, or as required to allow inspection, service and removal of items served.
   2. 14-gauge minimum sheet metal for doors, 16-gauge frames of cadmium-plated or galvanized construction. Doors shall have expanded plaster rings where located in plaster walls or flanged finish where located in drywall or block construction.
   3. Panels shall have spring hinges with screwdriver locks in non-public areas. Key lock, keyed alike, for panels in public areas.
   4. Prime painted or rust inhibitive paint finish.
   5. UL labeled when in fire-rated construction, 1 1/2 hour rating.
   6. Provide in walls, floors, and ceilings to permit access to all equipment and junction boxes.
   7. Furnish and locate access panels under this Division. Coordinate with trades who are responsible for building system in which panels are to be installed.
   8. Acceptable Manufactures: Milcor, Nystrom, Karp, J.L. Industries or Williams Brothers. Use panels equal to Milcor Style M for masonry and drywall construction; equal to Milcor Style K for plastered masonry walls and ceilings. Stainless steel panels shall be used in ceramic tile or glazed structural tile.

PART 3 - EXECUTION

3.01 COORDINATION

A. Install equipment in accordance with manufacturer's recommendations. Where conflicts occur between Contract Documents and these recommendations, request a ruling before proceeding with such Work.

B. Visit site and observe conditions under which work must be performed. No subsequent allowance will be made because of error or failure to obtain necessary information to completely estimate and perform work required by these documents.

C. Examine Specifications and Drawings to be familiar with items which require system connections and coordination. Electrical Drawings are diagrammatic and shall not be scaled for exact sizes.

D. Drawings are not to be submitted to Engineer. Submit a copy to the General Contractor and keep a copy on site for references. Notify design professional of conflicts that cannot be resolved.

3.02 FEES AND PERMITS

A. Obtain and pay for all necessary permits and inspection fees required for electrical installation.

3.03 DEMOLITION

A. Visit the site before submitting a bid to observe existing conditions.

B. Work in existing buildings shall be scheduled well in advance with the Owner. Work shall be performed at such times and under such conditions as suit the convenience of the Owner. Plan the Work to minimize disruption of normal operations. Notify Owner before any circuit is de-energized in occupied areas.

3.04 CUTTING AND PATCHING

A. Comply with provisions of Division 01.

B. Repair or replace routine damage caused by cutting in performance of Work under this Division.

C. Correct unnecessary damage caused due to installation of electrical Work, brought about through carelessness or lack of coordination.

D. Holes cut through floor slabs shall be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs between floors shall be properly sealed, fire proofed and water proofed.

E. Holes cut through walls shall be drilled or cut with tools designed for the purpose. All openings, sleeves and holes in walls that extend to underside of floor above shall be properly sealed and fire proofed.

F. Repairs shall be performed with materials which match existing materials and be installed in accordance with appropriate sections of these Specifications.

G. Contractor shall not be permitted to cut or modify any structural members without the written permission of the Designer.

END OF SECTION

SECTION 28 30 00

FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Comply with provisions of Section 28 05 00.

B. Include in the bid the cost to furnish and install additional devices required by the Authority Having Jurisdiction during the final inspection. Provide this cost as a separate line item with the unit cost for each device. Turn over to Owner devices not installed at the end of the project with a credit for the installation. Include the following device quantities in the cost:
   1. 5 Manual pull stations
   2. 10 Smoke detectors
   3. 5 Heat detectors
   4. 6 Duct smoke detectors with remote switches
   5. 15 A/V devices
   6. 5 Monitor modules
   7. 5 Control modules
   8. 5 Visual only devices

1.02 SUBMITTALS

A. Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections:
   1. Product data sheets for system components highlighted to indicate the specific products, features or functions required to meet the specification.
   2. Complete conduit and wiring layout showing the addition and point-to-point wiring diagram showing the point of connection to existing circuits being utilized. Include location of all devices and FACP.
   3. System power and battery charts with performance graphs and voltage drop calculations to assure the system will operate per the prescribed backup time periods and under all voltage conditions per UL and NFPA Standards and providing for a minimum of 20% spare capacity in each.
   4. Provide voltage drop calculations for signaling circuits.
   5. Select strobe candela rating to provide coverage per NFPA 72 Guidelines, ADA Accessibility Guidelines, and Manufacturer's recommendation.

1.03 TEMPORARY SYSTEM REQUIREMENTS

A. Existing fire alarm system shall be maintained operational until new system is operational.

B. Any interruption in area coverage shall require this Contractor to provide fire watch until coverage is restored.

C. Coordinate with Owner the extension of existing fire alarm system for temporary coverage in renovated areas.

1.04 SYSTEM DESCRIPTION

A. Provide a complete, non-coded, addressable, intelligent, microprocessor-based, reporting fire alarm system as indicated on the drawings and as specified herein, including but not limited to the following:
   1. Fire alarm control panel (FACP)
   2. Initiation devices
   3. Notification appliances
   4. Emergency voice/alarm communications equipment
   5. Firefighter's telephone system
   6. Monitoring and control devices
   7. Annunciators

B. Provide control panel with a resident, non-volatile, programmable operating system with the following:
   1. Program with logic and supervision for closed loop initiating device circuits, individual alarm appliance circuits and operating power, both A.C. and standby power.
   2. Capability of storing and downloading a second set of operating software resident in the control panel as backup in case the primary operating software is corrupted while the system is operating.
   3. Capability of on-site programming to accommodate system expansion and facilitate changes in operation.
   4. Instructions stored in memory that will not be erased upon loss of primary and secondary power.

C. Provide Fire Alarm Control Panel (FACP) with the following functions:
   1. Alarms and trouble conditions that display immediately on the alphanumeric, liquid crystal display indicating the floor level, smoke compartment and device.
   2. A system alarm, red LED that flashes until alarm is acknowledged, after which it remains illuminated steadily until system is reset, unless another alarm is received. The alarm LED will flash again and a new description will appear on the liquid crystal display upon receipt of another alarm.
   3. A pulsing tone that sounds upon arrival of each alarm, until acknowledged.
   4. The ability to scroll through the alarms and troubles existing in the system on the LCD display.
   5. An "alarm list" key that displays, in sequence, all possible alarm, trouble and supervisory service control functions.
   6. A priority sequence for signals with fire alarm events having the highest priority. Subsequent alarm events will be queued in order received and will not affect existing alarm conditions. Second, third and fourth level priorities will be given to supervisory and trouble events respectively. Signals of higher priority take precedence over signals of lower priority even though the lower priority condition occurred first. Regardless of priority or order received, all events will be annunciated.

7. A means to recall alarms and trouble conditions in chronological order for the purpose of creating an event history. Provide a separate alarm and trouble log with the capacity to store a minimum 300 alarms and 300 trouble events.
8. A system printer that records all alarm, supervisory, and trouble events including type of signal, the device identification, date and time of occurrence.
9. An alarm silence button that, upon acknowledgement of an alarm, silences the audible alarm signals while the visual alarm signals remains operating until the alarm is cleared. Upon receipt of a new alarm event, the system initiates the audible alarm signal again.
10. A system reset button that returns the system to its normal state after the system verifies all circuits or devices are restored to avoid the potential for re-alarming the system. Display message "Alarm Present, System Reset Aborted." if system device is not restored.

D. Provide FACP and system with smoke detector sensor self-checking, compensating and trouble indicating capabilities as follows:
1. Individually monitor smoke detector sensors for calibration, sensitivity, and alarm condition, and to individually adjust for sensitivity.
2. Determine the condition of each sensor by comparing the sensor value to the stored values.
3. Maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
4. Photoelectric smoke sensors with seven selectable sensitivity levels ranging from 0.2% to 3.7% programmed and monitored from the FACP.
5. Printable sensor reports that meet NFPA 72 calibrated test method requirements that can be utilized for annual recording and logging of the calibration maintenance schedule.
6. Continuous automatic self-test on each sensor that checks sensor electronics and ensures the accuracy of the values being transmitted. Upon test failure of any sensor, indicate a "Self Test Abnormal" trouble condition.
7. Automatic indication when an individual sensor needs cleaning with three progressive levels of reporting as the sensor's average value reaches predetermined values. The progressive levels that will be reached if sensors are left unattended and corresponding system reactions are:
    a. First level: indicates an "Almost Dirty" state without creating a trouble on the system.
    b. Second level: indicates a "Dirty Sensor" condition that requires attention but that does not affect the sensitivity level required to alarm the sensor, creating a trouble on the system.
    c. Third level: indicate an "Excessively Dirty Sensor" and a trouble condition shall be indicated on the control unit.

E. Provide supervisory service initiation device circuits for control of sprinkler valve tamper switches as follows:
1. Label circuits for supervisory service and visually and audibly differentiate between tamper switch activation and wiring faults.
2. Upon activation illuminate supervisory service LED and sound audible signal.

3. Upon depressing acknowledge switch, silence the audible and maintain the LED until valve has been returned to normal position.

F. Provide Emergency Voice/Alarm Communication capabilities integral to the FACP or within a separate cabinet as indicated. System capabilities to include:
   1. Alarm/evacuation signal generation with multiple built-in tones, digitally pre-recorded voice messages, and/or manual voice communications.
   2. Automatic or manual control of voice messaging.

G. Provide Firefighter's communication system providing two-way communication between a master telephone and up to six (6) remote telephones at one time. Locate telephone jacks as indicated on drawings. Provide system operation as follows:
   1. Flash the specific telephone jack LED and sound an audible tone at the fire command center upon plugging a handset into a remote jack. Silence the tone and illuminate the LED continuous upon picking up the master phone and acknowledging the specific telephone circuit. Open communications between the master phone and the remote location.

H. Wiring for the system shall conform to the following criteria:
   1. Provide Class B, Style 4 signaling line circuits (SLC) for initiating devices with minimum one isolation module per floor. Design the system with the appropriate number of SLCs so that on any floor, the quantity of initiating devices can be increased by 25% without adding a circuit.
   2. Provide Class B, Style Y notification appliance circuits (NAC) for speakers and visual strobe units as follows:
      a. Wire speakers and strobes on separate circuits.
      b. Dedicate each NAC to the floor it serves (except in stairwells).
      c. Design the system so that the number of notification appliances can be increased by 25% on each floor without adding a circuit.
      d. Provide "survivability" of circuits per NFPA 72 by protecting circuits that serve multiple evacuation signaling zones. The evacuation signaling zones match the building smoke compartment zones. Methods considered acceptable as meeting the survivability requirements include using a 2-hour rated cable or cable system or by installing circuits in a 2-hour rated chase. Circuits or portions of circuits that serve a single evacuation signaling zone do not have to meet this requirement.

I. Provide secondary power supply with battery backup in accordance with NFPA 72:
   1. Provide sufficient capacity to operate the emergency voice/alarm system under quiescent load (system operating in non-alarm condition) for a minimum 24 hours and at the end of that period be capable of operating the system under an emergency condition for a period of 15 minutes at maximum connected load.

1.05 SYSTEM OPERATION

A. Initiate an alarm condition on the fire alarm system when one or more of the following devices or inputs are activated:
   1. Manual pull station

2. Ceiling mounted smoke and heat detectors
3. Duct mounted smoke detectors in the supply and return ducts of air handling units
4. Projection beam detectors
5. Duct mounted smoke detectors in the supply and return ducts of air handling units and at each damper
6. Sprinkler system water flow switch
7. Preaction sprinkler system

B. Immediately perform the following alarm sequence when an alarm condition is activated on the system:
   1. Annunciate on the fire alarm system identifying the floor level, smoke compartment, room number and specific device(s) in alarm. (The room number used for identification shall be the room number assigned by the Owner and not necessarily the room number indicated on the floor plans. Coordinate the device description with the Owner.)
   2. Initiate a general fire alarm activating all audio/visual appliances.
   3. Close doors throughout the facility held open by electric door holders and deactivate all smoke barrier power operated doors.
   4. Unlock all egress doors that are electrically locked via a security or other system.
   5. Signal the Delta Room in the James K. Polk Building through the building EMS system.

C. Interface fire alarm system with the HVAC system such that when any device except a manual pull station activates an alarm condition, the following occurs in addition to the actions listed above:
   1. Shut down supply and return fans serving the affected smoke compartment.
   2. Close smoke dampers in the affected air handling systems.
   3. Shutdown systems 2000 cfm and less that serve egress corridors upon alarm in the respective smoke compartment.

D. Provide a monitor module for each disconnect switch associated with smoke control system fans. Interlock modules with auxiliary contacts of disconnect switches such that a trouble indication is received when disconnect switch is placed in the open position.

E. Provide an elevator lobby smoke detector zone. When one or more detectors sense smoke, send a signal to the FACP to perform the following functions:
   1. Initiate a general fire alarm and perform all other functions outlined above for ceiling mounted smoke detectors.
   2. Flash a lighted sign in the associated elevator lobby that reads "DO NOT USE ELEVATOR". (Provide this sign under this project)
   3. Initiate elevator recall sequence to automatically return elevators to a designated floor, where doors open and remain open until a fireman captures the elevator with a key in the elevator cab. Coordinate with Owner for designated return levels.
   4. Upon activation of lobby detectors on the designated floor, initiate the elevator recall to automatically return the elevators to an alternate floor as specified by Owner’s current programmer other than the designated floor, where the doors

open and remain open until the fireman captures the elevator with a key in the elevator cab. Verify the location of the alternate floor prior to programming.

5. Start elevator shaft pressurization fans (if installed).

F. Provide a separate elevator equipment room smoke detector zone. Upon activation of one of these smoke detectors, send a signal to the FACP to perform the following functions:
   1. Initiate all other functions described above for elevator lobby smoke detectors.
   2. Open the smoke damper(s) at elevator hoist way.

G. Provide a separate elevator equipment room heat detector zone with a 180 degree heat detector placed adjacent to and within 12 inches of each sprinkler head in the machine room. (Refer to Sprinkler shop drawings for exact number.) Upon activation of a heat detector, send a signal to the FACP to perform the following functions:
   1. Initiate all other functions described above for ceiling mounted heat detectors.
   2. Interrupt power to all elevator equipment within the elevator equipment room.

H. Where a motor operated damper is installed to vent the hoist way, provide a separate elevator hoist way smoke detector zone.
   1. Locate smoke detector at the top of each common shaft hoist way.
   2. Upon activation of a smoke detector in this zone, initiate the same functions as described above for the elevator equipment room smoke detectors.

I. If hoist way is sprinklered, provide a separate elevator hoist way heat detector zone.
   1. Install a 180 degree heat detector placed adjacent to and within 12 inches of each sprinkler head in the elevator shaft. Where sprinkler heads are installed in the bottom of the hoist way, install heat detectors 26 inches or more above the elevator pit floor.
   2. Upon activation of a heat detector in this zone, initiate the same functions as described above for the elevator equipment room heat detectors.

J. Provide smoke detectors located within 5 feet of both sides of fire rated roll-up windows and doors. Automatically close the window or door upon activation of the adjacent detectors only, using one set of "dry" contacts in the door holding circuit and initiate a general alarm through a second set of "dry" contacts. No other alarm source will cause the roll-up window or door to close.

K. Initiate a trouble tone and illuminate an LED light on the FACP to indicate a trouble condition under the following conditions:
   1. System wiring short circuit, open circuit or short to ground condition
   2. Failure of audio amplifier
   3. Failure of tone-generating equipment
   4. Failure of primary or secondary power supply
   5. Missing or failed initiating device

L. Initiate a supervisory tone and illuminate an LED light on the FACP to provide supervision of each distinct device under the following conditions:
   1. Activation of a sprinkler valve status switch

2. Activation of a sprinkler post indicator valve

M. Provide supervision and indication for certain non-system equipment on the FACP. Provide necessary relays with dry contacts at the equipment and monitor modules for the following points:
   1. Fire pump running
   2. Fire pump loss of phase (loss of power on any phase at the line terminals of the motor contactor)
   3. Fire pump phase reversal
   4. Fire pump controller connected to Alternate Power Source
   5. Elevator shunt-trip power "ON"
   6. Smoke control system fan is running (i.e., smoke removal, stair pressurization, etc.)
   7. Smoke control system fan disconnect is in the "open" position

N. Provide a Digital Alarm Communicator Transmitter (DACT) for signaling the central monitoring service that an alarm, trouble or supervisory alert condition exists at the facility. Provide equipment with the following:
   1. UL listing for fire reporting to a Central Station and meet performance requirements of NFPA 72.
   2. Battery backup.
   3. Supervise wiring from the FACP to the DACT

O. Upon initiation of alarms in zone(s) with power operated doors in rated walls, send these doors a signal to disable automatic operation and to release any specific locking function. Coordinate with door hardware schedule and specifications.

P. Contractor shall meet with Facility Administration and confirm exact programming occurrences, events and system notification prior to final programming of system. Specific programming functions shall include but not limited to Tower notification and special events. Final programming to be submitted to Facility Administration and Designer for approval before proceeding.

1.06 QUALITY ASSURANCE

A. Comply with applicable sections of NFPA 72; locally enforced code requirements and NEC article 760 for equipment and installation.

B. Provide all materials for the fire alarm system s listed as a product of a SINGLE fire alarm system manufacturer, bearing the UL label. Provide all control equipment listed under UL Category UOJZ as a single control unit. Partial listing is NOT acceptable.

C. Provide transient voltage protection for all control equipment to comply with UL 864.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

1. Simplex

2. Notifier
3. Honeywell

2.02 EQUIPMENT

A. Fire Alarm Control Panel: Provide FACP with the following functions, components and characteristics:
   1. UL 864 compliance.
   2. Microprocessor based Central Processing Unit (CPU) and power supply in a single cabinet.
   3. Lockable steel enclosure with a transparent door panel that prevents tampering while giving full view of controls and alarm lights. Provide door that is site configurable for right or left hand hinging. Where multiple cabinets are required to form a complete control unit, provide matching modular unit enclosures.
   4. Power supplies: 24VDC output, sufficient to supply 24VDC to all the fire alarm system equipment connected to the system
   5. Support for five RS-232-C ports and one service port with each RS-232-C port capable of supporting multiple, remote TFT plasma displays or printers.
   6. Include operator controls that are accessible behind the "see through" access door as follows:
      a. 80 character alphanumeric, LCD display.
      b. Red system alarm LED, separate yellow supervisory service and trouble LEDs, and a green power on LED.
      c. Acknowledge Switch that silences the local panel audible alarm when alarm is acknowledged.
      d. Alarm Silence Switch that silences the general audible alarms throughout the building while keeping the visual alarms active until the system status returns to normal.
      e. Alarm Activate (Drill) Switch that manually activates all notification appliance circuits.
      f. System Reset Switch that causes all initiating devices, appliances or software zones, as well as all associated output devices and circuits to return to their normal condition.
      g. Lamp Test Switch that activates all local system LEDs and light all segments of the liquid crystal display.
      h. Local City Loop Disconnect Switch that allows testing of the system without sending alarms to the central alarm station.
      i. An alpha numeric keypad with easy touch rubber keys for field programming.
   7. Provide FACP with capacity sufficient to accommodate the system defined by the contract drawings and these specifications. Include necessary provisions in the power supplies, batteries and system capacities for 25% spare capacity of monitor/control points and annunciation points without requiring the addition of expansion cards, power supplies, batteries, etc.
   8. Emergency Voice/Alarm System: Provide emergency voice/alarm system integral to the FACP with the following:
      a. Alarm/evacuation signal generation with multiple built in tones.

b. Standard or customized digital message storage and message generation.
c. Multiple digitally recorded human voice messages.
d. Automatic or manual operations of pre-recorded messages as well as a microphone for live messaging from operator.
e. Fully supervised NAC speaker circuits that can be manually turned on, off or disabled. Each circuit shall include a custom label to identify its location.
f. Local panel speaker for message broadcast verification.

9. Firefighter's Communication System: Provide Firefighter's communication system integral to the FACP with the following:
   a. Simultaneous communication between the master telephone and at least 20 remote telephones.
   b. Amplifiers
   c. Supervision of telephone circuits for open and short circuits.
   d. Degraded mode allowing remote telephones to remain connected to each other in the event of a communication loss.
   e. A separate cabinet located in the fire command center to store a minimum 6 firefighter's phones.
   f. Single gang phone jacks labeled "Fire Fighters Phone" located per the drawings.
   g. Telephone handsets constructed of red, high impact plastic with 6 foot coiled cord and matching plug.

B. Smoke Detectors:
   1. Photoelectric Smoke Detectors: Intelligent (analog) and addressable, utilizing the photoelectric light-scattering principle to measure smoke density. Furnish with the following:
      a. LED's that provide dual alarm and power indication. LED's flash green under normal conditions, indicating that the detector is operational and in regular communication with the FACP. LEDs produce a steady red light when an alarm condition has been detected.
      b. Ability to operate a remote alarm LED, an auxiliary relay or an audible base.
      c. Magnetically actuated test switch to provide for easy alarm testing at the detector location.
      d. Where called for on drawings, provide detector with an integral, resettable, thermistor-based, 135 degree Fahrenheit fixed-temperature heat detector.
   2. Ionization Smoke Detectors: Intelligent (analog) and addressable, utilizing the dual-chamber ionization principle to measure products of combustion, sending data to the panel representing the analog level of products of combustion on command from the FACP. Furnish with the following:
      a. LED's that provide dual alarm and power indication. LED's flash green under normal conditions, indicating that the detector is operational and in regular communication with the FACP. LEDs produce a steady red light when an alarm condition has been detected.

b. Ability to operate a remote alarm LED, an auxiliary relay or an audible base.
c. Magnetically actuated test switch to provide for easy alarm testing at the detector location.

3. Duct Mounted Smoke Detectors: Intelligent (analog) and addressable, utilizing the photoelectric light-scattering principle to measure smoke density. Furnish with the following:
   a. Sampling tubes of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied.
   b. Air duct housing designed for detection of smoke in HVAC ducts in accordance with NFPA 90. Provide with two test ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test activation of the duct smoke detector.
   c. A supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A @ 28VDC or 1/2 A @ 120VAC. This auxiliary relay operates when the detector reaches its alarm threshold. Mount relay within 3 feet of the HVAC control circuit.
   d. LED's that provide dual alarm and power indication. LED's flash green under normal conditions, indicating that the detector is operational and in regular communication with the FACP. LEDs produce a steady red light when an alarm condition has been detected.
   e. A remote test station with an alarm LED and test switch.
   f. UV stabilized plastic weatherproof duct housing with a NEMA 4X rating for use where detectors are installed on ducts located outside on the roof or otherwise. Housing shall circulate conditioned air from duct to maintain detector housing at rated temperature range. Install duct housing per manufacturer's instructions, providing additional ventilated, sheet metal canopy where the housing is mounted in direct sunlight.
4. Beam Smoke Detectors: Intelligent (analog) and addressable, utilizing a transmitter and receiver to project an infrared beam that is monitored by the receiver to determine smoke obscuration. Furnish with the following:
   a. LED's that provide dual alarm and power indication. LEDs flash green under normal conditions, indicating that the detector is operational and in regular communication with the FACP. LEDs produce a steady red light when an alarm condition has been detected.
   b. Coverage of distances up to 300 feet.
   c. Remote LED status indicator panel with remote test switch for each detector.

C. Heat Detectors: Intelligent (analog) and addressable, rated for 135 degrees Fahrenheit or 200 degrees Fahrenheit with a rate-of-rise element rated at 15 degrees Fahrenheit per minute. Furnish with the following:
   1. Automatic reset
   2. Ability to operating a remote alarm LED, an auxiliary relay or an audible base.
   3. Utilize 200 degree heat detectors in spaces with high ambient temperatures such as boiler rooms. Provide a remote module located where ambient temperature is lower and within recommended operating range of the addressable module.

D. Manual Pull Stations: Provide with the following:
   1. Double action operation.
   2. Red LEXAN or metal finished in red with molded, raised-letter operating instructions of contrasting color. Use metal pull stations where subject to damage.
   3. Station to mechanically latch upon operation and remain so until manually reset with a key common with the control units.
   4. Provide a tamper-proof, clear LEXAN shield and red frame that easily fits over manual pull stations where called for on drawings. Include a battery powered piercing warning horn to activate when shield is lifted to gain access to the station. Lowering and realigning the shield will silence the horn. Provide horn with 85dB at 10 feet and 9V battery operation.

E. Addressable Circuit Interface Modules: Individually addressable, utilized to monitor and/or control system components that are not otherwise equipped for addressable communication.
   1. Monitor modules shall supervise and monitor the status of non-addressable devices with normally open dry contacts. Module shall communicate device status (normal, alarm, trouble) to the FACP.
   2. Control modules shall supervise and control the operation of auxiliary devices. Module shall provide double pole, double throw relay switching for 2 amp @30 VDC resistive power limited and at 1/2 amp @120 VAC resistive, non-power limited. It shall contain easily replaceable 2 amp fuses, one on each common leg of the relay.
   3. Modules to be capable of mounting in a standard electric outlet box with cover plates to allow surface or flush mounting.
   4. Modules shall receive their operating power from the signaling line or a separate two wire pair running from an appropriate power supply as required.
   5. All circuit interface modules shall be supervised and uniquely identified by the control panel. Modules shall have an on board LED to provide indication that the module is powered and communicating with the FACP.

F. Alarm Notification Appliances:
   1. Combination Audible/Visual Devices. Provide UL 1480 listed device with the following:
      a. Red, impact resistant and flame retardant thermoplastic covers.
      b. High quality voice and tone reproduction, 4" speaker with matching transformer having taps for 1/4, 1/2, 1 or 2 watts at 25 or 70.7 VRMS input.
      c. Xenon flash tube and associated lens/reflector system with different flash intensities of 15, 15/75, 30, 75 and 110 candela. Furnish with a visible label inside the lens to indicate the listed candela rating.
   2. Ceiling Speaker (Voice capable). Provide UL 480 listed device with the following:
      a. Eight inch diameter single voice coil loudspeaker with dual (whizzer) cone and 10 oz. ceramic magnet.
      b. Fire-retardant and moisture-proof cone with factory mounted multi-tap transformer and DC blocking capacitor for line supervision.

c. Frequency response of 85 HZ - 8 kHz, +5 dB, power rating of 10 watts, 8 ohm impedance, and a sensitivity of 97 dB peak at 1 watt and 10 feet.
d. Standard round, white grille and a companion enclosure of welded CRS construction, finished in textured black epoxy, and be undercoated to guard against acoustical and mechanical resonance.
e. Mounting brackets capable of transferring the combined weight of the loudspeaker assembly to the ceiling support members via adjustable rails.

3. Visual Only Strobes. Provide UL 1971 listed device with the following:
   a. Xenon flash tube and associated lens/reflector system.
   b. Provide with different flash intensities of 15, 15/75, 30, 75 and 110 candela.
   c. Provide a visible label inside the lens to indicate the listed candela rating.
   d. Mount with red, impact resistant and flame retardant thermoplastic cover.
   e. Wall or ceiling mounted as show on drawings with the "FIRE" lettering oriented for easy reading.
4. Combination Horn/Visual Devices. Provide UL 1480 listed device with the following:
   a. Red, impact resistant and flame retardant thermoplastic covers.
   b. Electronic horn with loud, penetrating output. Sound output @ 24 VDC equal to 85 dBA @ 10 ft. for reverberant room test and 93 dBA @ 10 ft. for anechoic chamber test.
   c. Xenon flash tube and associated lens/reflector system with different flash intensities of 15, 15/75, 30, 75 and 110 candela. Furnish with a visible label inside the lens to indicate the listed candela rating.

G. Magnetic Door Hold Devices. Provide UL 228 listed device with the following:
1. Wall or floor mounting as indicated on drawings, complete with matching doorplate.
2. 24 VDC operation (unless otherwise required by the system) developing a minimum of 25 lbs. holding force.

H. Isolator Module:
1. Provide modules to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch, limiting the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch.
2. Provide at least one isolator module for each floor or protected zone of the building.
3. Provide automatic disconnection of the SLC when a wire-to-wire short occurs with automatic reconnection of the isolated section and when the short circuit condition is corrected.

I. Remote Monitors and Printers:
1. Monitors:
   a. Provide a minimum 19", full color, TFT plasma display units with 1024 x 1024 resolution and a keyboard.
   b. System status, system history or analog sensor status, service or history logs to be viewable on the display.

c. Provide password-protected status command line mode to allow user to perform disable/enable functions from the keyboard.

2. Remote printer: High-resolution 24-pin dot matrix type that is listed and labeled as an integral part of the fire alarm system.

J. Remote LCD Annunciator:
1. Primary Acknowledge, Silence, Reset Keys, Status LEDs and LCD display similar to the FACP.
2. Minimum two lines of 40 characters each and four programmable control switches and associated LEDs.
3. Operator keys shall be keyed switch enabled to prevent unauthorized use.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Provide services of a factory authorized service representative to supervise the field assembly and connection of components and the pre-testing, testing and adjustment of the system. Manufacturer's representatives to be available on a 24-hour basis within 150 miles of this project.

B. Provide system complete, in accordance with drawings, specifications and with manufacturer's instructions, including conduit, boxes, wiring and accessories.

C. Maintain the existing system fully operational at all times while the addition to the system is being constructed.

D. Device Labeling:
1. Coordinate all system programming, including device descriptors, with Owner in advance. Submit final programming for approval prior to implementation.
2. Label all initiating devices and associated remote indicating devices with the specific descriptor of that device. Coordinate with Owner for proper descriptors of each device. Provide a minimum 3/8-inch high lettering, located on device so it is visible from the ground.

E. Wiring Installation:
1. Install wiring in conduit and tag wires at junction points.
2. Obtain from Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. Make no deviation from the written instructions without prior written approval from the Fire Alarm System manufacturer and engineer of record.
3. Color-code fire alarm conductors differently from normal building power wiring. Use one color code for alarm initiating circuit wiring and a different color code for supervisory circuits. Color code notification appliance circuits differently from alarm initiating circuits.
4. Install wiring to central station transmitter in a 1 inch conduit from FACP to the central station transmitter connection. Install the quantity of conductors and

electrical supervision for connecting wiring as required to suit the central station monitoring function.

5. For each exterior circuit, in addition to the number of panel wires required, provide a green grounding conductor for operation of transient protection cube. Obtain ground at panel nearest to the point of cube application, but in no case exceed 28 feet of wire length.
6. Provide a dedicated normal power, 120 volt circuit to power the FACP and DACT. Provide a red marking on the circuit breakers for these circuits and identify them as "Fire Alarm Circuit".

F. Provide on-premise warranty service during normal working hours at no cost for a period of twelve months from date of completion and acceptance.

G. Smoke Detectors:
1. For addressable smoke detectors, permanently write the address in the base so that it is visible with the smoke head removed, where the address is contained in the smoke head.
2. Mount ceiling smoke detectors no less than 3 feet from a supply, return or exhaust air diffusers, and 3 feet from electronic ballasts. Coordinate with division 15 for diffuser locations.

H. Duct Mounted Smoke Detectors:
1. Provide duct smoke detectors as specified on drawings for HVAC supply, return and exhaust fans and ducts. Verify exact location and quantities in field.
2. Install duct smoke detectors in the supply air stream of an air handling unit downstream of filters and at least 6 feet from humidifier, preferably upstream.
3. Install duct smoke detectors within 5 feet of smoke dampers where required.
4. Install duct smoke detectors in the return air stream of an air handling unit on upstream side of outside air inlet.
5. Furnish and connect duct detectors under this Division but install them under Division 23.
6. Support sampling tube within the duct and extend at least 3/4 of the distance across the duct.
7. Mount detectors the appropriate distance from ells, turns, etc. as required by the detector manufacturer.
8. Where duct detectors are mounted above ceilings or above 6 feet in mechanical rooms, provide remote LED alarm light and test switch in ceiling close to detector or surface mounted on an adjacent wall of mechanical room.

I. Alarm Devices:
1. Wire flashing lights separately from audible alarms. When alarm signal is silenced, lights shall continue to flash until the condition responsible for the system alarm has been cleared and reset.
2. Provide synchronized visual devices throughout project.
3. Comply with ADA Regulations for mounting of strobe units. Depending upon the configuration of the strobe unit, utilize mounting requirements as follows:
    a. Mount strobe unit 80 inches to bottom of the device faceplate, measured from the highest floor level of area served, and

b. Entire lens shall not be less than 80 inches or greater than 96 inches above the finished floor.

4. Locate visual alarm devices in corridors per the plans but no more than 15 feet from the end of a corridor or an interruption of the viewing path such as a corridor door or an elevation change. Locate devices in corridors no more than 100 feet apart.

J. Water Flow and Tamper Switches:
1. Assign a separately addressable, supervised point and annunciate separately each water flow switch and each valve tamper switch.
2. Connect existing sprinkler water flow switches to the fire alarm system. Verify exact location and quantity of flow switches in field.
3. Install existing valve status switch on each sprinkler system valve and PIV (Post Indicator Valve). Verify exact location and quantity of valve status switches and PIV switches in field.

K. System is to automatically actuate certain control functions and monitor or supervise points. Electrically supervise wiring to auxiliary fire alarm relays used to activate such functions or monitor/supervise points. Locate relays within 3 feet of the device controlled, such as a motor starter. Functions for which circuits are to be supervised include, but are not limited to, the following:
1. Release of door hold-open devices
2. Shutdown of selected HVAC systems or activation of smoke control systems
3. Stair pressurization
4. Elevator shunt trip power
5. Elevator hoist way pressurization
6. Sprinkler valve status switches
7. Air pressure status on dry-pipe systems
8. Disconnect switch position on smoke control equipment

3.02 TEST AND CERTIFICATION

A. Provide a 10 day minimum notice in writing when the system is ready for final acceptance testing. Send notice after pre-testing has been completed to confirm that the system conforms to the drawings and specifications and malfunctioning or damaged devices have been replaced.

B. Test completed fire alarm system in the presence of Owner's representative and the AHJ. After test, certify test was completed, deficiencies were corrected and system performs as specified.

C. Upon completion of smoke detector installations, test each detector's sensitivity and compare the installed sensitivity with that recorded at the factory when the detector was manufactured and shipped. Replace detectors that test out of limits. Prepare a typewritten tabulation of these tests along with name and signature of tester. Include the following information:
1. Smoke detector descriptor
2. Smoke detector location in the project

3. Sensitivity value - field test
4. Sensitivity value - factory test
5. Within limits - "yes" or "no"

D. Provide the services of a factory authorized service representative to demonstrate the system and train the Owner's maintenance personnel. Include procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintenance of the system in the training. Provide a minimum of 8 hours of training. Schedule training with the Owner at least 14 days in advance.

E. Test system in accordance with the procedures outlined in NFPA 72.

F. Completion Documents:
1. Furnish a written record of inspections, tests, and detailed test results in the form of a test log
2. Prepare the "Fire Alarm System Record of Completion" document per NFPA 72
3. Upon final acceptance furnish the following to the Owner's representative:
   a. "Record of Completion" document
   b. Owner's manual and installation instructions covering all system equipment
   c. Record drawings to include point-to-point wiring, layout plans, and battery calculations.
   d. Record Drawings and Operation Manual on "CD" or "DVD", 2 copies.

END OF SECTION